FINGERPRINT RECOGNIZING DEVICE HAVING PATTERNED FLOATING ELECTRODES AND FABRICATING METHOD THEREFOR

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a fingerprint recognizing device having patterned floating electrodes and a fabricating method therefor, and more particularly, to a fingerprint recognizing device having patterned floating electrodes and a fabricating method therefor which are capable of more clearly generating a fingerprint image generated from the fingerprint recognizing device used for identifying a person.

Description of the Related Art

Generally, a fingerprint recognizing device is a device which generates and outputs an image of a fingerprint formed on a finger of a person as an optical image. As disclosed in the Korean Patent Application No. 1998-0036742 "Contact light emitting device and fabricating method therefor and contact input apparatus using the same" and as shown in Fig. 1, the fingerprint recognizing device includes a transparent electrode layer 2 to which one terminal of an AC power source is connected, a light emitting layer 3 formed on the transparent electrode layer 2 and forming an electric

fie]d between the transparent electrode layer 2 and a finger 10 forming a ground contact when being contacted with the finger 10 and emitting light by this electric filed for generating an optical fingerprint image according to ridge lines 10a of a fingerprint image formed on the finger 10, and a transparent insulating layer 1 formed at the bottom of the transparent electrode layer 2 and for transmitting the optical image generated from the light emitting layer 3.

In the thusly constituted fingerprint recognizing device according to the conventional art, a fingerprint image is outputted as a gray image in a state where the ridge lines 10a of the fingerprint are directly contacted with the surface of the light emitting layer 3. As the fingerprint image is outputted as the gray image, the fingerprint image is not clear in processing the fingerprint image using the optical fingerprint image generated from the fingerprint recognizing device, thus making the processing of the image difficult.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide a fingerprint recognizing device having patterned floating electrodes and a fabricating method therefor, in the fingerprint recognizing device having a transparent insulation layer, a transparent

electrode layer and a light emitting layer, by forming patterned floating electrodes on a surface of the light emitting layer, a fingerprint image generated to the fingerprint recognizing device is outputted as states of turning on/off.

It is another object of the present invention in which an optical fingerprint image generated to a fingerprint recognizing device is outputted as states of turning on/off, thus making the processing of the optical fingerprint image easier.

To achieve the above object, there is provided a fingerprint recognizing device comprising: a transparent electrode layer to which one terminal of an AC power source is connected; a light emitting layer formed on the transparent electrode layer and forming an electric field between the transparent electrode layer and a finger forming a ground contact when being contacted with the finger and emitting light by this electric filed for generating an optical fingerprint image according to ridge lines of a fingerprint image formed on the finger; a plurality of patterned floating electrodes arranged on the surface of the light emitting layer at a predetermined interval and turned on/off to output the optical fingerprint image; and a transparent insulating layer formed at the bottom of the transparent electrode layer and for transmitting the optical image generated from the light emitting layer.

In addition, there is provided a method for fabricating a fingerprint recognizing device comprising the steps of: forming a transparent insulating layer using a transparent insulating material; forming a transparent electrode layer on the transparent insulating layer using a transparent conductive material; mixing 25~35wt.% dielectric polymer paste, a 25~29wt.% retarder, and 30~50wt.% dopant-doped luminous powder and then forming a light emitting layer on the top of the transparent electrode layer using the mixture; and forming a plurality of patterned floating electrodes on the surface of the light emitting layer using a conductive material so that they are spaced at a predetermined interval.

BRIEF DESCRIPTION OF THE DRAWINGS

The above objects, features and advantages of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a cross-sectional view of a conventional fingerprint recognizing device;

Fig. 2 is a cross-sectional view of a fingerprint recognizing device according to the present invention;

Fig. 3 is a plane view of the fingerprint recognizing device as shown in Fig. 2; and

Fig. 4 is a cross-sectional view illustrating a fingerprint recognizing device according to another embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the present invention will now be described with reference to the accompanying drawings.

Fig. 2 is a cross-sectional view of a fingerprint recognizing device according to the present invention. Fig. 3 is a plane view of the fingerprint recognizing device as shown in Fig. 2.

As illustrated in Figs. 2 and 3, the fingerprint recognizing device according to the present invention includes: a transparent electrode layer 2 to which one terminal of an AC power source is connected; a light emitting layer 3 formed on the transparent electrode layer 2 and forming an electric field between the transparent electrode layer 2 and a finger 10 forming a ground contact when being contacted with the finger 10 and emitting light by this electric filed for generating an optical fingerprint image according to ridge lines 10a of a fingerprint image formed on the finger 10; a plurality of patterned floating electrodes 11 arranged on the surface of the light emitting layer 3 at a predetermined interval and turned on/off to output the

optical fingerprint image and a transparent insulating layer 1 formed at the bottom of the transparent electrode layer 2 and for transmitting the optical image generated from the light emitting layer 3.

That is, the fingerprint recognizing device of the present invention includes a transparent insulating layer 1, a transparent electrode layer 2, a light emitting layer 3 and a plurality of patterned floating electrodes 11. The transparent electrode layer 2 is disposed on the top of the transparent insulating layer 1, the light emitting layer 3 is disposed on the top of the transparent electrode layer 2, and the plurality of patterned floating electrodes 11 are disposed on the top of the light emitting layer 3.

As one terminal of the AC power source is connected to the transparent electrode layer 2 formed on the top of the transparent insulating layer 1, an AC power flows between the transparent electrode layer 2 and the plurality of patterned floating electrodes 11 when DC is supplied to the transparent electrode layer 2. When the finger 10 having ridge lines 10a and a gully 10b formed thereon is contacted to the surface of the plurality of patterned floating electrodes 11, an electric field is formed between the transparent electrode layer 2 and the finger 10.

The electric field formed by such a process results in inducing an electric field between the

transparent electrode layer 2 and the plurality of patterned floating electrodes 11. Here, an insulating layer 12 is formed on intervals of the patterned floating electrodes 11 and on the top of the floating electrodes 11 in order to protect the patterned floating electrodes 11.

By the electric field formed between the transparent electrode layer 2 and the plurality of patterned floating electrodes 11, the light emitting layer 3 emits light for thereby generating an optical fingerprint image according to the ridge lines 10a of the finger 10. The fingerprint image generated from the light emitting layer 3 is outputted through the transparent electrode layer 2 and the transparent insulating layer 1. Here, the plurality of patterned floating electrodes 11 are arranged in a lattice pattern in a state of being disposed on the surface of the light emitting layer 3 at a predetermined fine interval.

In this way, by arranging the plurality of patterned floating electrodes 11 on the surface of the light emitting layer 3 in a lattice pattern, one patterned floating electrode 11 serves as one pixel for thereby outputting the optical fingerprint image generated by the light emission of the light emitting layer 3 by turning on/off the floating electrode in unit of pixel. Therefore, the fingerprint image can be processed in unit of pixel, thus making the processing

of the image easier.

A fabricating method for the thusly constituted fingerprint recognizing device according to the present invention will now be described.

Firstly, as illustrated in Fig. 2, the step of forming a transparent insulating layer 1 using a transparent insulating material is performed. When the transparent insulating layer 1 is formed, the step of forming a transparent electrode layer 2 on the transparent insulating layer 1 using a transparent conductive material is performed. Then, 25~35wt.% dielectric polymer paste, a 25~29wt.% retarder, and 30~50wt.% dopant-doped luminous powder are mixed and the step for forming a light emitting layer 3 on the top of the transparent electrode layer 2 using the mixture is performed.

When the light emitting layer 3 is formed, the plurality of patterned floating electrodes are formed on the surface of the light emitting layer 3 using a conductive material so that they are spaced at a predetermined interval. Here, the plurality of patterned floating electrodes 11 are formed on the surface of the light emitting layer 3 in a lattice pattern as illustrated in Figs. 2 through 4. To prevent penetration by moisture and impurities between the plurality of patterned floating electrodes 11 and to make the floating electrodes stronger against a wet finger by

inducting an electric field indirectly, not by directly contacting to the floating electrodes, the insulating layer 12 is formed using an insulating material so that the space between the plurality of patterned floating electrodes 11 can be buried.

The insulating layer 12 is formed of a hydrophobic material and prevents penetration by impurities between the plurality of patterned floating electrodes 11 and makes the floating electrodes 11 stronger against a wet finger. In addition, to increase the luminance of the light emitting layer 3, a dielectric layer 13 instead of the hydrophobic material is formed between the patterned floating electrodes 11 and the light emitting layer 3 as shown in Fig. 4.

As seen from above, by arranging the plurality of patterned floating electrodes 11 on the surface of the light emitting layer 3 in a lattice pattern and forming the insulating layer on the top of the patterned floating electrodes, an optical fingerprint image is generated by turning on/off one patterned floating electrode in unit of pixel, thus making the processing of the image easier.

As explained above, in the fingerprint recognizing device and the fabricating method therefor, by arranging the plurality of patterned floating electrodes 11 on the surface of the light emitting layer 3 in a lattice pattern and forming the insulating layer on the top of

top of the patterned floating electrodes, an optical fingerprint image is generated by turning on/off one patterned floating electrode in unit of pixel, thus making the processing of the image easier.

While the invention has been shown and described with reference to certain preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.